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# Forest Health

## 2012 highlights

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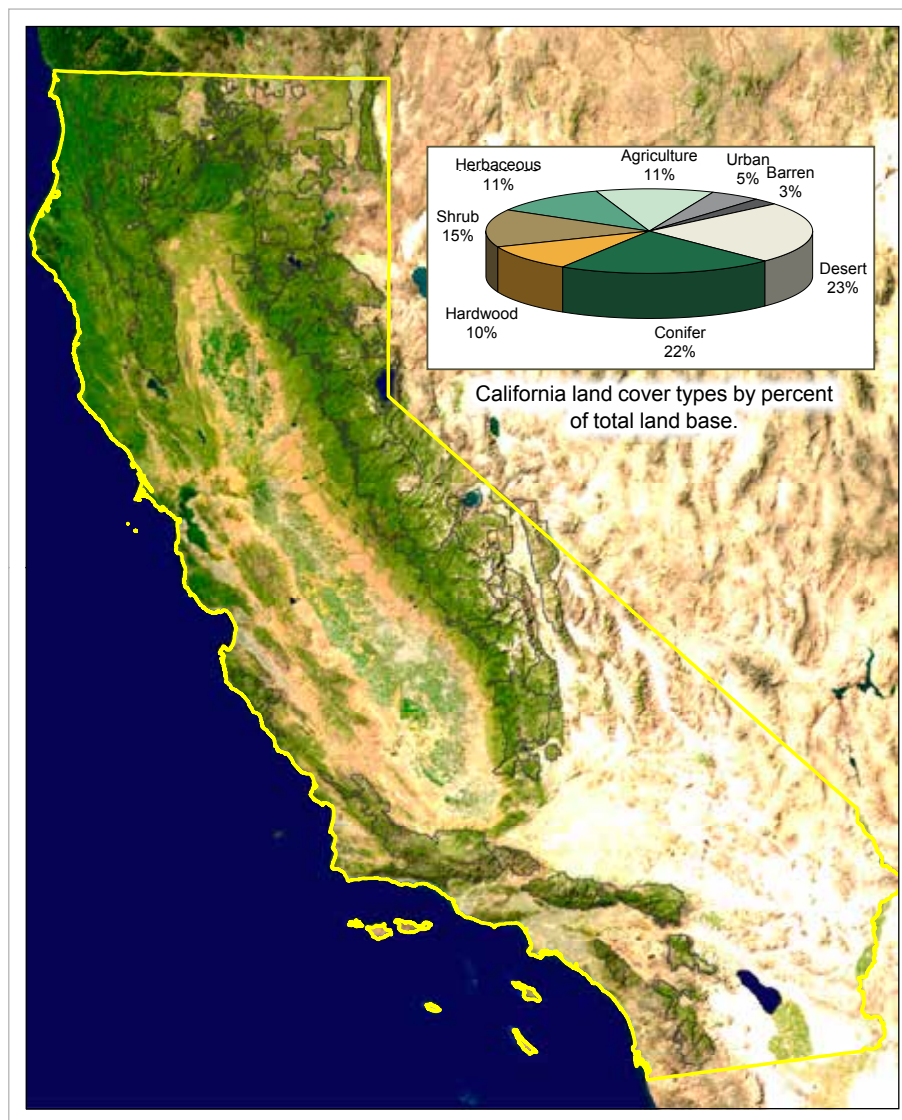
## Forest Resource Summary

From the Cleveland to the Klamath, California's 18 National Forests contain a treasure of wildlife, recreation, and much more. More than 600 of the 800 species of fish and wild animals, and over 4,000 of the 6,500 native plants in California reside in National Forests. These National Forests account for 25 percent of National Forest recreation visits nationwide and about half of the public wild land recreation in the state. National Parks and other federal, state, county and private lands provide the remainder.

Region 5 of the USDA Forest Service works cooperatively with federal and state partners to map, measure, monitor and assess the effects of biotic and abiotic agents on California's forests. California's forests are among the most complex and diverse in the nation, with 25 major forest types occurring across 32 million acres of the state. Approximately 33% of California is forested and susceptible to a variety of forest pests, such as bark beetles and root diseases, depending on geographic location. Tree density, stand structure, air pollution, drought and other environmental factors contribute to tree decline.

### Environmental Conditions

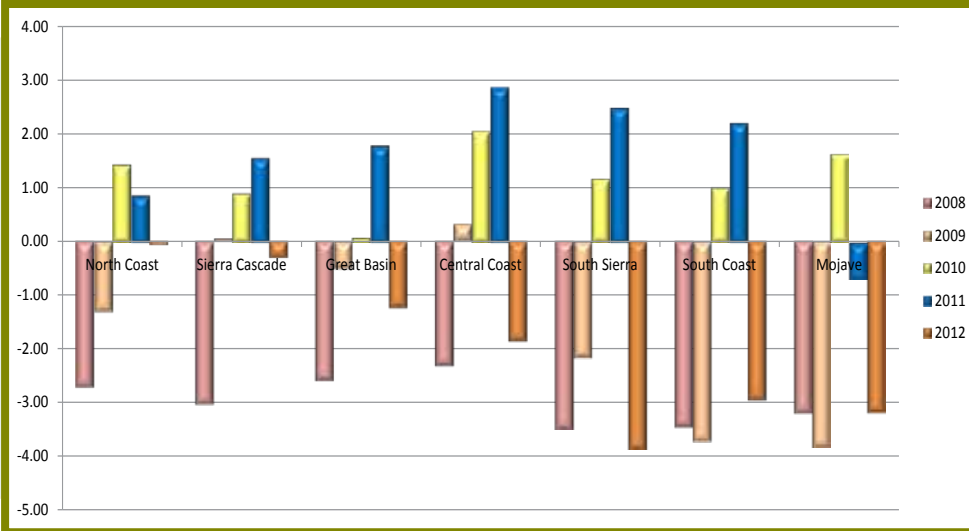
In 2012, California received below-average precipitation (75% of average statewide) and decreased snow-pack (55% of April 1 snowpack average statewide). The lower than average precipitation may have contributed to increases in bark beetle activity. Even higher levels should be expected in 2013 in areas where dry conditions persist. The decreased snowpack also resulted in poor insulation of small trees and ground vegetation, leading to frost injury and winter desiccation in many areas of the Sierra Range. Rapid fluctuations in winter temperatures also lead to foliage damage, especially to lodgepole pine. Rainfall occurred later in the season than normal, resulting in several foliar pathogens, such as anthracnose, becoming more widespread and potentially increasing the spread of pathogens such as *Phytophthora ramorum* (sudden oak death).





Palmer Drought Index

The Palmer Drought Index is an indicator of drought or moisture excess and ranges from -6 to +6, with negative values denoting degree of drought. In 2012 the yearly average Palmer Drought index values were negative across the State, ranging from -0.07 on the North Coast to -3.88 in the South Sierra. The wettest zone was the North Coast and the driest was in the southern Sierra Nevada range.

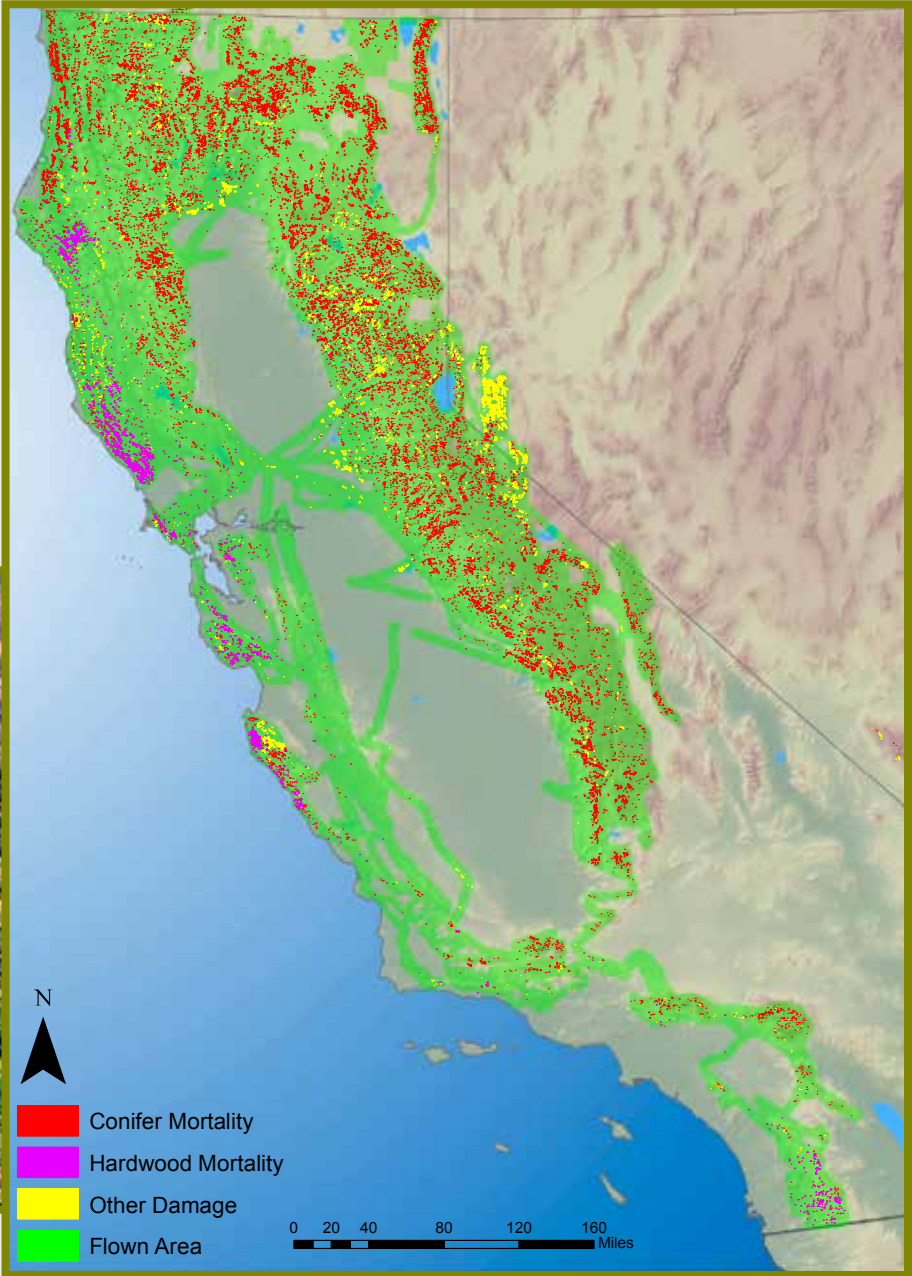


2012 Aerial Detection Survey

Aerial surveys are conducted annually to assess the health of California’s forests. Surveyors fly in light, fixed-wing aircraft and use a digital sketch-mapping system to rapidly document tree mortality and damage events across the State. In 2012, 47 million acres were surveyed throughout California. Some level of tree mortality was detected on 511,000 acres, a slight decrease from 2011. This decrease was attributed to less white and red fir mortality. Aerial surveys for sudden oak death showed an increase in tanoak mortality over 2011, with especially high rates of mortality in southern Humboldt County, Sonoma County, and Carmel Valley.



Tanoak mortality from sudden oak death on Mescal Ridge, Los Padres NF. Photo by: T. Coleman



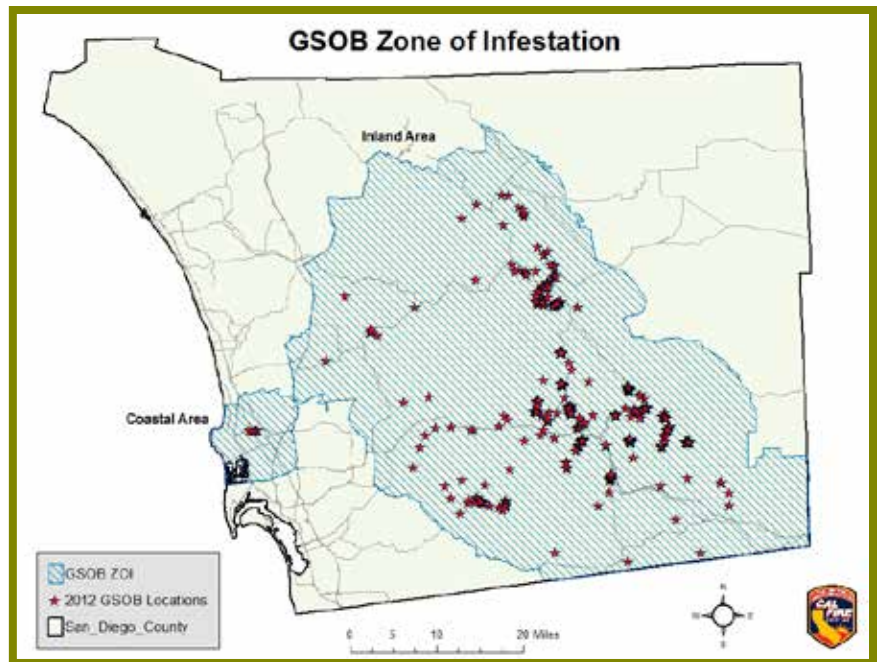


## Goldspotted Oak Borer (GSOB)

Since 2002, the invasive beetle goldspotted oak borer (GSOB) has killed thousands of oak trees in San Diego County. It is believed that GSOB was transported into California on firewood brought in from Arizona. A Zone of Infestation was established in September of 2012 by the California State Board of Forestry to increase awareness of the potential threat to the rest of the state and further support control efforts. In October of 2012, GSOB was discovered for the first time in neighboring Riverside County, representing a 40 mile jump from its previously known distribution. This infestation is likely the result of GSOB being transported in and emerging from oak firewood brought into the area.

## Polyphagous Shot Hole Borer

In 2012, the polyphagous shot hole borer, *Euwallacea* sp., was linked to injury and mortality on private land in Los Angeles and Orange Counties. This beetle was first detected in California in 2003, but was only recently associated with injury, which is now occurring on several hardwood species. This ambrosia beetle carries a new species of *Fusarium*, which in combination with the beetle has caused mortality in English oak and boxelder in urban settings. California sycamore, California bay laurel, coast live oak, big leaf maple and avocado are susceptible to attack, showing cankering and crown dieback. The insect-disease complex was not detected on public land in 2012, but one infestation is adjacent to the Angeles National Forest.



Exudate on English oak.  
Photo by: K. Camilli



Beetles and galleries in castor oil plant. Photo by: A. Eskalen

## Balsam Woolly Adelgid

Historically, the range of balsam woolly adelgid in California has been restricted to the San Francisco Bay Area, with one light outbreak reported in Sacramento in 1986. In 2012, balsam woolly adelgid populations were found on grand fir along a 20-mile stretch of coastal Mendocino County, a jump of over 100 miles from previously reported locations. Stem infestations were found at multiple sites in the area, with only one location exhibiting gouting of branches. One site had over half of the grand fir infested, with heavily infested stems showing excessive pitching. No trees have died from these infestations.





Western pine beetle-caused mortality in ponderosa pine.  
Mendocino NF, California. Photo: B. Oblinger



Douglas-fir killed by Douglas-fir  
beetle, Lassen NF. Photo: D. Cluck

## Bark and Engraver Beetles

Western pine beetle-caused mortality of ponderosa pine and Coulter pine increased in nearly all parts of the trees' ranges. Large groups of ponderosa pines were killed on lower elevation, drier sites or sites impacted by root disease or fire. Within existing outbreak areas, mountain pine beetle continued to cause high levels of mortality in whitebark and lodgepole pine. Additionally, mountain pine beetle activity in sugar pine increased in many locations.

Jeffrey pine beetle remained relatively low throughout the state in 2012 with only a slight increase from 2011. Fir engraver activity generally declined from 2011 levels. Douglas-fir beetle was observed in northeastern California for the first time in many years, where the beetle was found attacking large diameter trees in dense stands.



Whitebark and lodgepole mortality, Modoc NF, California.  
Photo: D. Cluck



## Defoliators

Defoliation caused by the white fir sawfly was widespread in northeastern California. Additionally, white fir in some defoliated areas also sustained frost and wind desiccation injury to elongating shoots in late spring. This combined injury resulted in completely defoliated crowns rather than just the loss of older foliage due to sawfly feeding. Activity by the black oak leaf blotch miner remained high in both intensity and extent on the Tahoe National Forest, however, no tree mortality has been documented as a result of this 8 year outbreak. Satin moth feeding on aspen caused heavy defoliation of stands in the Lake Tahoe Basin and on the Lassen National Forest. This is the first report of this insect causing defoliation of aspen in several years. The California oakworm outbreak continued in the Carmel and Monterey areas causing heavy defoliation of blue, valley, and coast live oaks. Other defoliators observed causing damage in California included fall webworm, fruit-tree leaf roller, and western tent caterpillar.



White fir sawfly larvae feeding on foliage, Lassen NF. Photo: R. Mahnke



Webbing and feeding injury on madrone leaves caused by fall webworm, Tahoe NF. Photo: D. Cluck



Western tent caterpillars on bitterbrush, Lassen NF. Photo: D. Cluck

## Native Diseases

Foliar diseases were influenced by late spring and early summer precipitation. Oak and sycamore anthracnose were common in various parts of California, and madrone foliar leaf blight continued for another year. In addition, Elytroderma on pine was very common throughout the southern Sierra Nevada range.

Root diseases, including Heterobasidion root rots, black stain root disease and Armillaria continued to cause extensive tree loss losses in various parts of California.

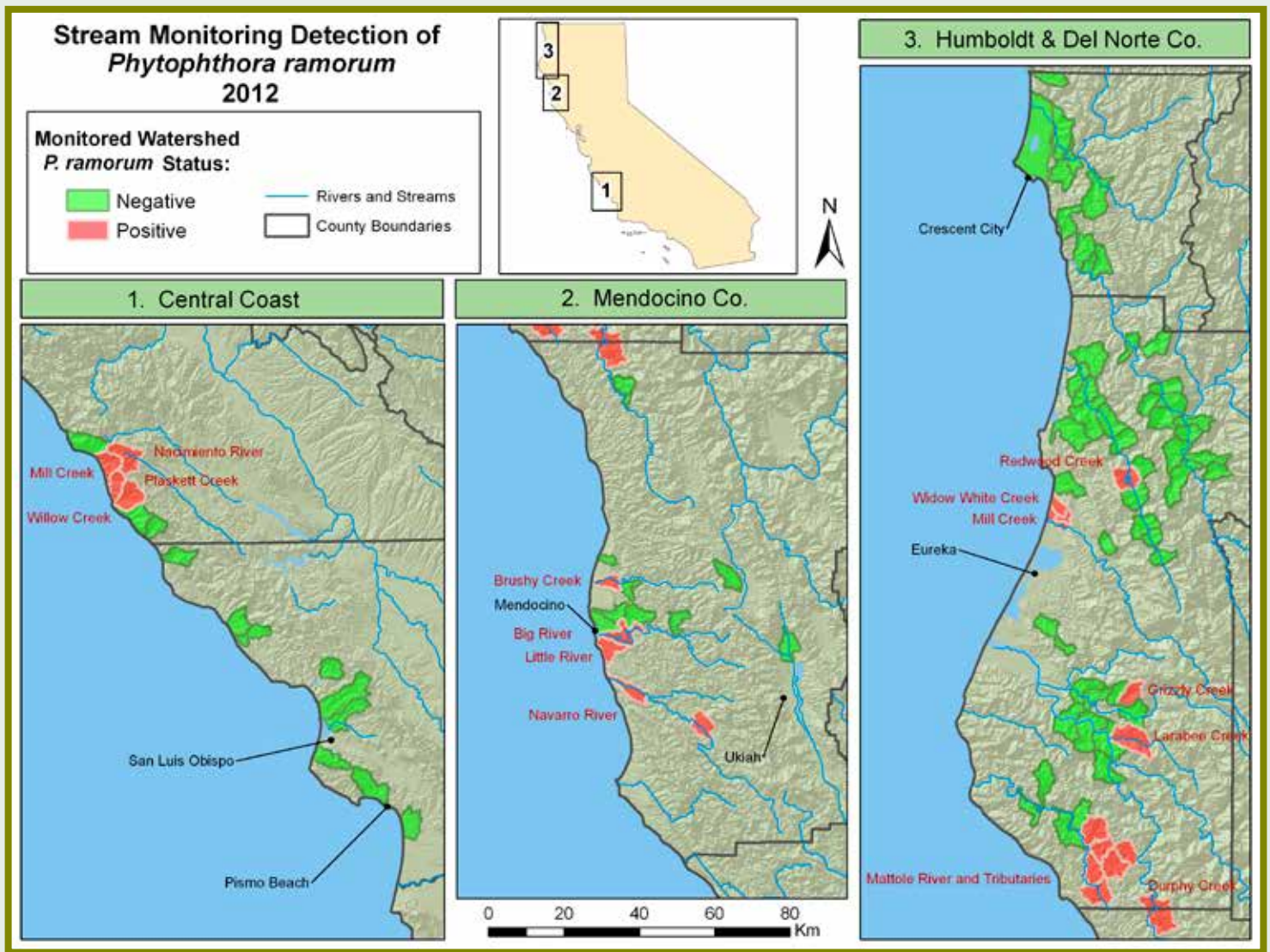


*Heterobasidion occidentale* fruiting bodies from an infected white fir stump, Mendocino NF. Photo: P. Angwin



Ponderosa pine mortality caused by black stain root disease and western pine beetle, Shasta-Trinity NF. Photo: P. Angwin





Introduced exotic pathogens continued to inflict some of the worst disease problems in California. *P. ramorum* (sudden oak death) caused the death of hundreds of thousands of trees in the state in 2012. Nurseries continued to harbor the disease despite efforts to eradicate it in these situations. In addition, the disease continued to spread into formerly non-infested areas within the general infected area and was found further north in Humboldt Co. where an eradication program is underway. This disease has not yet spread further south than Monterey County or east into the Sierra Nevada range.

Pitch canker disease, white pine blister rust, and Port-Orford-cedar root disease all continued to affect and kill trees. Pitch canker intensified in Point Reyes National Seashore. Work to identify trees genetically resistant to white pine blister rust throughout the state continued. Eradication of Port-Orford-cedar root disease has been a priority at select sites in northwestern California.

## Invasive Plants

California is home to thousands of native plant species and is recognized internationally as a “biodiversity hotspot”. Approximately 1,800 non-native plants also grow in the State, several of which are considered troublesome in forested areas. No new species of invasive plants were reported to the California Forest Pest Council in 2012.

The California Invasive Plant Council, (Cal-IPC) provides information to help land managers deal more effectively with invasive plants. In 2012, Cal-IPC focused on two major efforts: 1) mapping and risk assessment, and 2) prevention. Mapping efforts included the compilation of invasive plant distribution data for 204 invasive species and then integrated climate change models to predict distributions of 79 invasive species for 2050. These data are available through the CalWeedMapper system ([calweedmapper.calflora.org](http://calweedmapper.calflora.org)). Prevention efforts included the publication of two Best Management Practices manuals on preventing the spread of invasive plants.

Local eradication and control efforts were ongoing for several invasive plants, including several species of thistle, knapweed, tamarisk, perennial pepperweed, tree of heaven, arundo, Himalaya blackberry, and gorse.

If you have questions about forest insect and disease activity in California, please contact personnel in one of these regional or field offices:

Forest Health Protection  
USDA Forest Service, Regional Office  
1323 Club Drive  
Vallejo, CA 94592  
Sheri Smith: 530.252.6667  
Phil Cannon: 707.562.8913  
David Bakke: 707.562.8916  
Matthew Bokach: 707.562.8691  
Zhanfeng Liu: 707.562.8774  
email: [ssmith@fs.fed.us](mailto:ssmith@fs.fed.us)  
[pcannon@fs.fed.us](mailto:pcannon@fs.fed.us)  
[dbakke@fs.fed.us](mailto:dbakke@fs.fed.us)  
[mattbokach@fs.fed.us](mailto:mattbokach@fs.fed.us)  
[zliu@fs.fed.us](mailto:zliu@fs.fed.us)

Forest Health Protection  
Shasta-Trinity National Forest  
3644 Avtech Parkway  
Redding, CA 96002  
Pete Angwin: 530.226.2436  
Cynthia Snyder: 530.226.2347  
email: [pangwin@fs.fed.us](mailto:pangwin@fs.fed.us)  
[clsnyder@fs.fed.us](mailto:clsnyder@fs.fed.us)

Forest Health Protection  
Stanislaus National Forest  
19777 Greenley Road  
Sonora, CA 95370  
Beverly Bulaon: 209.532.3672, 323  
Martin MacKenzie: 209.532.3672, 242  
email: [bbulaon@fs.fed.us](mailto:bbulaon@fs.fed.us)  
[mmackenzie@fs.fed.us](mailto:mmackenzie@fs.fed.us)

Forest Health Protection  
Lassen National Forest  
2550 Riverside Drive  
Susanville, CA 96130  
Danny Cluck: 530.252.6431  
Bill Woodruff: 530.252.6680  
email: [dcluck@fs.fed.us](mailto:dcluck@fs.fed.us)  
[wwoodruff@fs.fed.us](mailto:wwoodruff@fs.fed.us)

Forest Health Protection  
San Bernardino National Forest  
602 S. Tippecanoe Ave  
San Bernardino, CA 92408  
Tom Coleman: 909.382.2871  
Melody Lardner: 909.382.2727  
email: [twcoleman@fs.fed.us](mailto:twcoleman@fs.fed.us)  
[mlardner@fs.fed.us](mailto:mlardner@fs.fed.us)

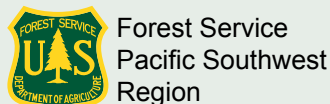
USDA Forest Service  
State and Private Forestry  
Forest Health Monitoring  
1731 Research Park Drive  
Davis, CA 95616  
Zachary Heath: 530.759.1751  
Jeff Moore: 530.759.1753  
Meghan Woods: 530.759.1750  
email: [zheath@fs.fed.us](mailto:zheath@fs.fed.us)  
[jwmoore@fs.fed.us](mailto:jwmoore@fs.fed.us)  
[meghanwoods@fs.fed.us](mailto:meghanwoods@fs.fed.us)

Forest Pest Management  
CAL FIRE  
6105 Airport Road  
Redding, CA 96002  
Don Owen: 530.224.2494  
email: [don.owen@fire.ca.gov](mailto:don.owen@fire.ca.gov)

Forest Pest Management  
CAL FIRE  
2690 North State Street  
Ukiah, CA 95482  
Jack Marshall: 707.462.5886  
email: [jack.marshall@fire.ca.gov](mailto:jack.marshall@fire.ca.gov)

Forest Pest Management  
CAL FIRE  
4050 Branch Road  
Paso Robles, CA 93446  
Kim Camilli: 530.224.2494  
email: [kim.camilli@fire.ca.gov](mailto:kim.camilli@fire.ca.gov)

Forest Pest Management  
CAL FIRE  
P.O. Box 944246  
Sacramento, CA 94244-2460  
Tom Smith: 916.653.9476  
email: [tom.smith@fire.ca.gov](mailto:tom.smith@fire.ca.gov)



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